



FPL Energy.

Duane Arnold Energy Center

FPL Energy Duane Arnold, LLC
3277 DAEC Road
Palo, Iowa 52324

April 26, 2007

NG-07-0366
10 CFR 50.73

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D.C. 20555-0001

Duane Arnold Energy Center
Docket 50-331
License No. DPR-49

Licensee Event Report #2007-004-00

Please find attached the subject Licensee Event Report (LER) submitted in accordance with 10 CFR 50.73. This letter makes no new commitments or changes to any existing commitments.

Gary Van Middlesworth
Site Vice President, Duane Arnold Energy Center
FPL Energy Duane Arnold, LLC

cc: Administrator, Region III, USNRC
Project Manager, DAEC, USNRC
Resident Inspector, DAEC, USNRC

JE22

LICENSEE EVENT REPORT (LER)

(See reverse for required number of
digits/characters for each block)

Estimated burden per response to comply with this mandatory collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollect@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

1. FACILITY NAME

Duane Arnold Energy Center

2. DOCKET NUMBER

05000 331

3. PAGE

1 OF 4

4. TITLE

Severe Weather Causes Grid Disturbance Resulting In Loss of Shutdown Cooling

| 5. EVENT DATE | | | 6. LER NUMBER | | | 7. REPORT DATE | | | 8. OTHER FACILITIES INVOLVED | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| MONTH | DAY | YEAR | YEAR | SEQUENTIAL NUMBER | REV NO. | MONTH | DAY | YEAR | FACILITY NAME | DOCKET NUMBER | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 02 | 24 | 2007 | 2007 | 4 | 0 | 04 | 26 | 2007 | | 05000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9. OPERATING MODE 5 | | | 11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply) | | | | | | | | DOCKET NUMBER 05000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | DOCKET NUMBER 05000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10. POWER LEVEL 000 | | | <table border="0"><tr><td><input type="checkbox"/> 20.2201(b)</td><td><input type="checkbox"/> 20.2203(a)(3)(i)</td><td><input type="checkbox"/> 50.73(a)(2)(i)(C)</td><td><input type="checkbox"/> 50.73(a)(2)(vii)</td></tr><tr><td><input type="checkbox"/> 20.2201(d)</td><td><input type="checkbox"/> 20.2203(a)(3)(ii)</td><td><input type="checkbox"/> 50.73(a)(2)(ii)(A)</td><td><input type="checkbox"/> 50.73(a)(2)(viii)(A)</td></tr><tr><td><input type="checkbox"/> 20.2203(a)(1)</td><td><input type="checkbox"/> 20.2203(a)(4)</td><td><input type="checkbox"/> 50.73(a)(2)(ii)(B)</td><td><input type="checkbox"/> 50.73(a)(2)(vii)(B)</td></tr><tr><td><input type="checkbox"/> 20.2203(a)(2)(i)</td><td><input type="checkbox"/> 50.36(c)(1)(i)(A)</td><td><input type="checkbox"/> 50.73(a)(2)(iii)</td><td><input type="checkbox"/> 50.73(a)(2)(ix)(A)</td></tr><tr><td><input type="checkbox"/> 20.2203(a)(2)(ii)</td><td><input type="checkbox"/> 50.36(c)(1)(ii)(A)</td><td><input checked="" type="checkbox"/> 50.73(a)(2)(iv)(A)</td><td><input type="checkbox"/> 50.73(a)(2)(x)</td></tr><tr><td><input type="checkbox"/> 20.2203(a)(2)(iii)</td><td><input type="checkbox"/> 50.36(c)(2)</td><td><input checked="" type="checkbox"/> 50.73(a)(2)(v)(A)</td><td><input type="checkbox"/> 73.71(a)(4)</td></tr><tr><td><input type="checkbox"/> 20.2203(a)(2)(iv)</td><td><input type="checkbox"/> 50.46(a)(3)(ii)</td><td><input checked="" type="checkbox"/> 50.73(a)(2)(v)(B)</td><td><input type="checkbox"/> 73.71(a)(5)</td></tr><tr><td><input type="checkbox"/> 20.2203(a)(2)(v)</td><td><input type="checkbox"/> 50.73(a)(2)(i)(A)</td><td><input type="checkbox"/> 50.73(a)(2)(v)(C)</td><td><input type="checkbox"/> OTHER</td></tr><tr><td><input type="checkbox"/> 20.2203(a)(2)(vi)</td><td><input type="checkbox"/> 50.73(a)(2)(i)(B)</td><td><input type="checkbox"/> 50.73(a)(2)(v)(D)</td><td>Specify in Abstract below or in NRC Form 366A</td></tr></table> | | | | | | | | <input type="checkbox"/> 20.2201(b) | <input type="checkbox"/> 20.2203(a)(3)(i) | <input type="checkbox"/> 50.73(a)(2)(i)(C) | <input type="checkbox"/> 50.73(a)(2)(vii) | <input type="checkbox"/> 20.2201(d) | <input type="checkbox"/> 20.2203(a)(3)(ii) | <input type="checkbox"/> 50.73(a)(2)(ii)(A) | <input type="checkbox"/> 50.73(a)(2)(viii)(A) | <input type="checkbox"/> 20.2203(a)(1) | <input type="checkbox"/> 20.2203(a)(4) | <input type="checkbox"/> 50.73(a)(2)(ii)(B) | <input type="checkbox"/> 50.73(a)(2)(vii)(B) | <input type="checkbox"/> 20.2203(a)(2)(i) | <input type="checkbox"/> 50.36(c)(1)(i)(A) | <input type="checkbox"/> 50.73(a)(2)(iii) | <input type="checkbox"/> 50.73(a)(2)(ix)(A) | <input type="checkbox"/> 20.2203(a)(2)(ii) | <input type="checkbox"/> 50.36(c)(1)(ii)(A) | <input checked="" type="checkbox"/> 50.73(a)(2)(iv)(A) | <input type="checkbox"/> 50.73(a)(2)(x) | <input type="checkbox"/> 20.2203(a)(2)(iii) | <input type="checkbox"/> 50.36(c)(2) | <input checked="" type="checkbox"/> 50.73(a)(2)(v)(A) | <input type="checkbox"/> 73.71(a)(4) | <input type="checkbox"/> 20.2203(a)(2)(iv) | <input type="checkbox"/> 50.46(a)(3)(ii) | <input checked="" type="checkbox"/> 50.73(a)(2)(v)(B) | <input type="checkbox"/> 73.71(a)(5) | <input type="checkbox"/> 20.2203(a)(2)(v) | <input type="checkbox"/> 50.73(a)(2)(i)(A) | <input type="checkbox"/> 50.73(a)(2)(v)(C) | <input type="checkbox"/> OTHER | <input type="checkbox"/> 20.2203(a)(2)(vi) | <input type="checkbox"/> 50.73(a)(2)(i)(B) | <input type="checkbox"/> 50.73(a)(2)(v)(D) | Specify in Abstract below or in NRC Form 366A |
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12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME

Laura Swenzlinski, Licensing Engineer

TELEPHONE NUMBER (Include Area Code)

(319) 851-7724

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

| CAUSE | SYSTEM | COMPONENT | MANU-FACTORER | REPORTABLE TO EPIX | CAUSE | SYSTEM | COMPONENT | MANU-FACTORER | REPORTABLE TO EPIX |
|-------|--------|-----------|---------------|--------------------|-------|--------|-----------|---------------|--------------------|
| | | | | | | | | | |

14. SUPPLEMENTAL REPORT EXPECTED

☐ YES (If yes, complete 15. EXPECTED SUBMISSION DATE) ☒ NO15. EXPECTED
SUBMISSION
DATE

| MONTH | DAY | YEAR |
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| | | |

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

On February 24, 2007, while the plant was shutdown and in Mode 5 for Refueling Outage 20, a severe winter storm brought freezing rain, ice and high winds to the Duane Arnold Energy Center (DAEC) grid area causing degraded voltage conditions on the essential busses. The DAEC was performing Core Alterations and the B Standby Diesel Generator (SBDG) was being manually run for post maintenance testing at the time.

Beginning at 1654, transmission lines to the DAEC switchyard began to be lost due to severe weather. At 1755, the A SBDG automatically started on bus undervoltage. At 1756 Core Alterations were secured based on indications that the grid was becoming unstable. At 1757 a full scram occurred due to loss of B Reactor Protection System (RPS) and Neutron Monitoring System Trip on the A RPS, and Groups 1 through 5 isolations (excluding the Main Steam Isolation Valves) occurred, resulting in a loss of Shutdown Cooling.

At 1820, bus degraded voltage conditions caused both running SBDGs to load onto their respective busses, causing a loss of Fuel Pool Cooling, General Service Water, and B Control Building Chiller. At 1825, grid voltage recovered, however subsequent conversations with the grid operator indicated that the area grid, including the DAEC switchyard, was isolated from most of the offsite power sources and that only two 161KV lines remained powered into the DAEC switchyard. At 1835, all work activities in the power block were suspended.

The essential busses remained powered by their respective SBDG. Grid repair and recovery allowed the essential bus 1A4 power supply to be transferred from the B SBDG to the Startup Transformer at 1148 on February 25, 2007. The essential bus 1A3 power supply was transferred from the A SBDG to the Startup Transformer at 0049 on February 26, 2007.

There were no actual safety consequences and no effect on public health and safety as a result of this event.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

| FACILITY NAME (1) | DOCKET NUMBER (2) | LER NUMBER (6) | | | PAGE (3) |
|----------------------------|-------------------|----------------|----------------------|--------------------|----------|
| Duane Arnold Energy Center | 05000331 | YEAR | SEQUENTIAL NUMBER | REVISION NUMBER | 2 of 4 |
| | | 2007 | -- 004 -- | 00 | |

TEXT (If more space is required, use additional copies of NRC Form 366A) (17)

I. Description of Event:

On February 24, 2007, while the plant was shutdown and in Mode 5 for Refueling Outage 20, a severe winter storm brought freezing rain, ice and high winds to the DAEC grid area, causing degraded voltage conditions on essential busses. The DAEC was performing Core Alterations and the B SBDG was being manually run for post maintenance testing. The A Residual Heat Removal (RHR) Pump was operating in Shutdown Cooling mode. Time to boil was calculated as 36 hours and 48 minutes. Both Fuel Pool Cooling Pumps were in service providing cavity and fuel pool cooling, since the Fuel Pool Gates were removed and the reactor was flooded up. The A Control Building Chiller was inoperable and in day 1 of 30 per TS 3.7.5 Condition A.

The DAEC switchyard is supplied by six offsite circuits of which two are 345KV (Hazelton and Tiffin/Hills) and four are 161KV (Fairfax, 6th Street, Dysart/Vinton and Hiawatha). Due to severe weather conditions, the Hazelton line was lost at 1654, the Tiffin/Hills line was lost at 1714. At 1755, the A SBDG automatically started on bus undervoltage. The A SBDG did not load since the power remained available from the startup transformer. The B SBDG was already manually started for regulator tuning following governor replacement. Core Alterations were secured at 1756 based on indications that the grid was becoming unstable. At 1757 a full scram occurred due to loss of B RPS and Neutron Monitoring System Trip on the A RPS, and Groups 1 through 5 isolations (excluding the Main Stream Isolation Valves) occurred, resulting in a loss of Shutdown Cooling. At the time of the scram, all control rods were inserted in cells containing fuel, therefore, there was no rod movement.

At 1820, bus degraded voltage conditions caused both running SBDGs to load onto their respective essential busses. Fuel Pool Cooling, General Service Water (GSW) and B Control Building Chiller were lost due to load shedding. At 1825, grid voltage recovered, however subsequent conversations with the grid operator indicated that the area grid, including the DAEC switchyard, was isolated from most of the offsite power sources and only the 6th Street and Hiawatha 161KV lines remained powered into the DAEC switchyard. All work activities in the power block were suspended at 1835. The essential busses remained loaded to the SBDG.

Shutdown Cooling was restored to operation at 1826. GSW was restored to operation at 1844. At 1850, the B Control Building Chiller and Fuel Pool Cooling system operation commenced. The RPS scram signal was reset at 1912.

Grid repair and recovery allowed the essential bus 1A4 power supply to be transferred from the B SBDG to the Startup Transformer at 1148 on February 25, 2007. The essential bus 1A3 power supply was transferred from the A SBDG to the Startup Transformer at 0049 on February 26, 2007.

This event was reported to the NRC as an 8 hour event under 10 CFR 50.72(b)(3)(iv)(B), Any event or condition that results in valid actuation of: (1) Reactor protection system (RPS) including reactor scram and reactor trip, (2) General containment isolation signals affecting containment isolation valves in more than one system or multiple main steam isolation valves (MSIVs), and (8) emergency ac electrical power systems; 10CFR 50.72(b)(3)(v), Any event or condition that could have prevented the fulfillment of the safety function of structures or systems that are needed to: (A) Shut down the reactor and maintain it in a safe shutdown condition, and (B) Remove residual heat.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

| FACILITY NAME (1) | DOCKET NUMBER (2) | LER NUMBER (6) | | | PAGE (3) |
|----------------------------|-------------------|----------------|----------------------|--------------------|----------|
| Duane Arnold Energy Center | 05000331 | YEAR | SEQUENTIAL NUMBER | REVISION NUMBER | 3 of 4 |
| | | 2007 | -- 004 | -- 00 | |

TEXT (If more space is required, use additional copies of NRC Form 366A) (17)

At the time of this event the plant was in day 1 of 30 of Technical Specification 3.7.5 Condition A Limiting Condition for Operation for one Control Building Chiller subsystem inoperable.

II. Assessment of Safety Consequences:

This report is being submitted pursuant to 10CFR50.73(a)(2)(iv)(A), 10CFR50.73(a)(2)(v)(A) and 10CFR50.73(a)(2)(v)(B).

In this event, disturbance of the offsite electrical grid resulted in automatic loading of the SBDGs and in temporary loss of Shutdown Cooling. However, significant margin existed throughout the event to the unacceptable consequence of uncovering spent fuel due to boiling of the water in which it is submerged.

A large volume of water covered the fuel in the reactor vessel and in the spent fuel pool, and the rate of decay heat production was relatively low since 21 days had elapsed since the reactor had been shutdown. Therefore, a long period of time would be required for this body of water to start to boil (estimated to be approximately one and one-half days) in the event that cooling systems failed to operate. Although the Shutdown Cooling system was out of service for approximately one-half hour, there was no noticeable change in reactor coolant temperature during this time.

Momentary loss of power to essential busses 1A3 and 1A4 caused both Shutdown Cooling and Spent Fuel Pool Cooling pumps to trip. Power was available to both systems however, upon connection of the SBDGs to their respective essential buses. Therefore, the water in both the reactor and spent fuel pool were maintained near their initial temperatures.

This event did not result in a Safety System Functional Failure.

III. Cause of Event:

An investigation was completed under Apparent Cause Evaluation (ACE) 1697. The cause of this event was a severe winter storm that brought snow, ice accumulation and high winds to the area. This storm caused extensive damage to the area including damage to the electrical grid.

IV. Corrective Actions:

There are no corrective actions related to the degraded voltage event because the causes, severe weather conditions, are outside the control of the DAEC.

V. Additional Information:Previous Similar Occurrences:

LER 90-007 documents a loss of offsite power to the essential buses that occurred when the Standby Transformer was inadvertently de-energized. At the time of the event, the plant was in cold shutdown with essential power being supplied by the Standby Transformer due to the Startup Transformer being out of service for maintenance.

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TEXT (If more space is required, use additional copies of NRC Form 366A) (17)

The cause of this event was determined to be a personnel error by a non-nuclear utility system protection technician who failed to block trip signals during a breaker failure relay test. The task being performed was not covered by an approved procedure.

ELIS System and Component Codes:

DA – Fuel Pool Cooling and Purification System
EA – Medium-Voltage Power System (601V through 35kV)
EK – Emergency Onsite Power Supply System
FK – Switchyard System
JM – Containment Isolation Control System
VI – Control Building/Control Complex Environmental Control System
BO – RHR Shutdown cooling
JC – RPS
KG – GSW

Reporting Requirements:

This report is being submitted under 10CFR50.73(a)(2)(iv)(A), 10CFR50.73(a)(2)(v)(A) and 10CFR50.73(a)(2)(v)(B).